



## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P2227PC00	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/NO2004/000128	International filing date (day/month/year) 05.05.2004	Priority date (day/month/year) 05.05.2003	
International Patent Classification (IPC) or national classification and IPC G01N29/10			
Applicant CLAMPON AS et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 03.03.2005		Date of completion of this report 27.10.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Uttenthaler, E Telephone No. +49 89 2399-7568 	

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**International application No.  
PCT/NO2004/000128**Box No. 1 Basis of the report**

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))  
☐ publication of the international application (under Rule 12.4)  
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements\* of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-10 as originally filed

**Claims, Numbers**

1-12 received on 10.10.2005 with letter of 10.10.2005

**Drawings, Sheets**

1/4-4/4 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages  
☐ the claims, Nos.  
☐ the drawings, sheets/figs  
☐ the sequence listing (*specify*):  
☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages  
☐ the claims, Nos.  
☐ the drawings, sheets/figs  
☐ the sequence listing (*specify*):  
☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-12
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-12
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

**2. Citations and explanations (Rule 70.7):****see separate sheet**

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**Re Item V**

**1. Cited documents**

The following documents are referred to in this communication; the numbering will be adhered to in the rest of the procedure:

**D3:** GB 2 303 704 (Daniel Alexander C) 26 February 1997 (1997-02-26)

**D6:** US 6 370 964 (CHANG FU-KUO et al.) 16 April 2002 (2002-04-16)

**2. Novelty and Inventive Step (Art. 33(2)(3) PCT)**

**Claim 1:**

Claim 1 do not appear to fulfill the requirements of the PCT set out in Article 33(3) with respect to an inventive step:

D6, which is considered to represent the most relevant state of the art, discloses a method to register the structural features in an acoustic conducting material, such as the sheet material (abstract and col. 2, line 64 - col. 3 line 2, D6) of a pipe, a duct, container and the like, where instrumentation is fitted on the surface of the material whereby acoustic signals are emitted from said instrumentation and received in/through the solid material, and also that changes in the received signals as a consequence of changes in the structure of the material are registered (col. 6, line 63 - col. 7, line 7, D6), wherein a sensor, or several sensors mutually spaced apart, is (are) arranged in contact with the surface of the material (figs. 1A and 1B and col. 6, lines 4-20, D6), and the sensor (s) is (are) made to emit and receive acoustic signals to provide information about occurrences of defects in the solid material, and also the position of such defects (abstract, col. 3, lines 63 and fig. 12, col. 14, line 32-35, D6), characterized in that the sensor(s) measure(s) the presence and location of a structural change (col. 3, lines 61-66, D6), by detecting changes in signal characteristics, such as frequency content and speed (col. 10, lines 30-46, D6).

Therefore claim 1 differs from D6 in that the sensor(s) measure(s) the presence and location of a structural change based on the wall thickness of the solid pipe material

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over a cross-section.

The skilled person who sees the problem starting from D6 to test material with different geometric shapes with the thin and flexible diagnostic layer, would regard it as obvious to integrate the diagnostic layer to a cylindrical shell structure, such as a pipe and test it accordingly and he would, thus, arrive at the subject matter of claim 1 without involving any inventive activity.

**Therefore, claim 1 is not inventive.**

**Claim 8:**

It appears that the above objections to claim 1 equally apply, *mutatis mutandis*, to the corresponding apparatus claim 8.

**Therefore, also claim 8 is not inventive.**

**Dependent claims:**

The dependent claims 2-7 and 9-12 appear to relate to mere design modifications, consequential features, conventional features or features already present in the arrangement of D6 and, therefore, do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to an inventive step.

The master sensor claimed in claims 3, 4 or 8 appears to be a conventional design option for a diagnostic instrumentation device.

**3. Miscellaneous**

- a. The prior art D6 and D3 are not identified in the description and the relevant background art disclosed therein is not briefly discussed (Rule 5.1a(ii) PCT).
- b. The features of the claims are not provided with reference signs placed in parentheses to increase the intelligibility of the claims (Rule 6.2(b) PCT).

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CLAIMS

1. Method to register the structural features in an acoustic conducting material, such as the sheet material of a pipe, a duct, container and the like, where instrumentation is permanently fitted on the surface of the material whereby acoustic signals are emitted from said instrumentation and received in/through the solid material, and also that changes in the received signals as a consequence of changes in the structure of the material are registered, wherein a sensor, or several sensors mutually spaced apart, is (are) arranged in contact with the surface of the material, and the sensor(s) emit/receive acoustic signals to provide information about occurrences of defects in the solid material, and also the position of such defects, characterised in that the sensor(s) measure(s) the presence and location of a structural change based on the wall thickness of the solid pipe material over a cross-section, by detecting changes in signal characteristics, such as frequency content and speed.

2. Method according to claim 1, characterised in that one sensor measures the presence and location of a structural change by alternatively switching between active (emitting) and passive mode (receiving).

3. Method according to claim 1, characterised in that the position of a defect is determined by carrying out a so-called cross-bearing, i.e. by collating distance and angle between a number of individual sensors and the defect.

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4. Method according to claims 1 or 3, characterised in  
that each sensor communicates with a control unit that is  
formed by one of the sensors, a so-called master sensor,  
with the master sensor regulating the transmission and  
5 reception of acoustic signals by the sensors.
5. Method according to one of the claims 1-4,  
characterised in that when the sensors emit and receive,  
respectively, acoustic signals with the same frequency, the  
10 signals are emitted with mutual time intervals.
6. Method according to one of the preceding claims,  
characterised in that when the sensors emit and receive  
acoustic signals at different frequencies, the signals are  
15 emitted simultaneously or with mutual time intervals.
7. Method according to claim 1, characterised in that  
one single sensor, the master sensor, is applied and the  
information about the material structure is provided by  
20 registering reflections from the structure changes/defects  
in the sheet material.
8. System to register structural features in an acoustic  
conducting material, such as the sheet material of a pipe,  
25 a duct, container and the like, comprising instrumentation  
permanently fitted onto the surface of the material and  
which is arranged to emit and receive acoustic signals  
in/through the solid material and also to register changes  
in the received signals as a consequence of changes in the  
30 structure of the material, wherein the instrumentation  
comprises a sensor, or several sensors mutually spaced  
apart, in contact with the surface of the material, and the  
sensor(s) is(are) arranged to emit and receive signals to  
provide information about occurrences of defects in the  
35 solid material, and also the position of such defects,  
characterised in that the sensor(s) are adapted to measure  
the presence and location of a structural change based on  
the wall thickness of the solid pipe material over a pipe

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cross-section, by detecting changes in signal characteristics, such as frequency content and speed.

9. System according to claim 8, characterised in that  
5 when one sensor is used, said sensor is arranged to function as both sender and receiver, by alternatively switching between active (emitting) and passive mode (receiving).

10 10. System according to claim 8, characterised in that  
when one or more sensors are used, each individual sensor is arranged to communicate with a master sensor, and  
that the master sensor is arranged to regulate the emission and reception, respectively, of acoustic signals  
15 by the sensors.

11. System according to one of the claims 10,  
characterised in that each individual sensor is connected to the master sensor via cables.

20 12. System according to claims 10-11, characterised in  
that the master sensor is arranged to control the time of emission of acoustic signals from each sensor, and also the used frequency characteristics.

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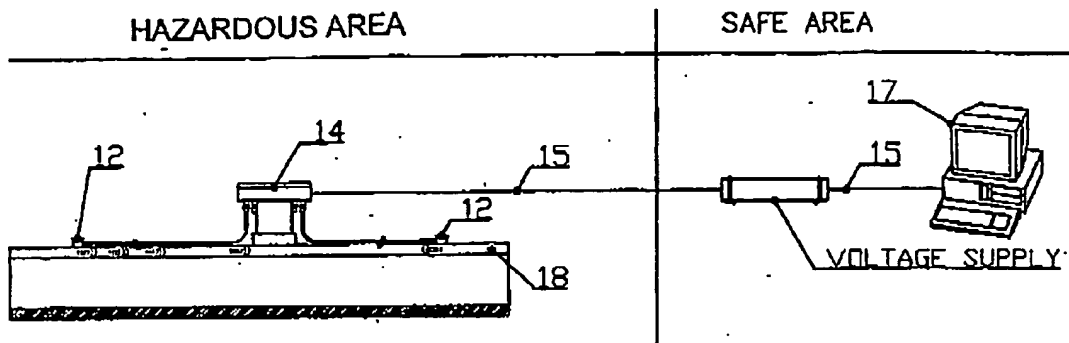


FIG. 1

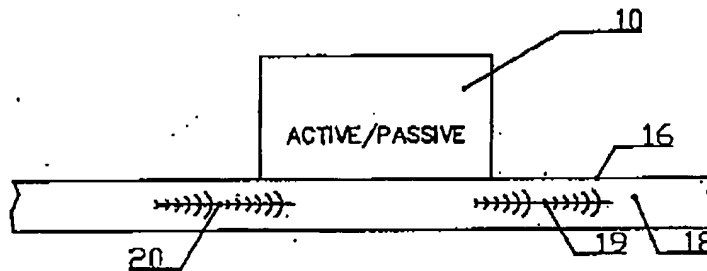


FIG. 2

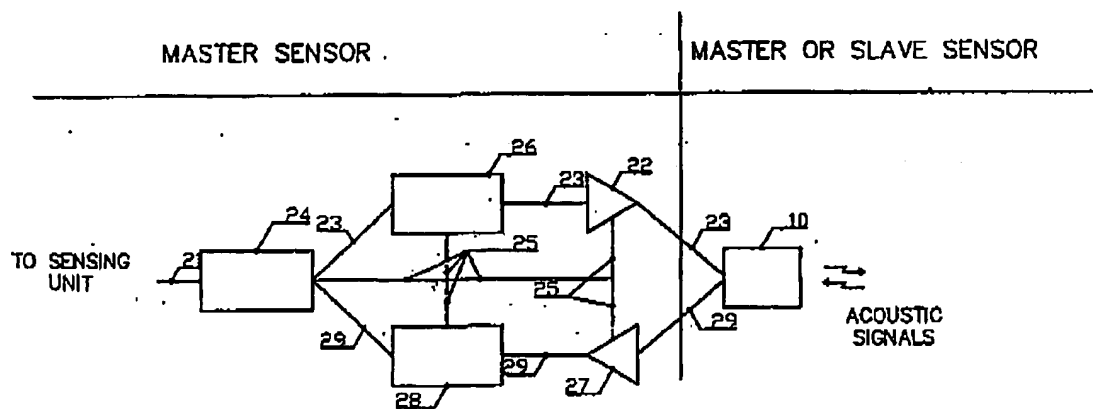


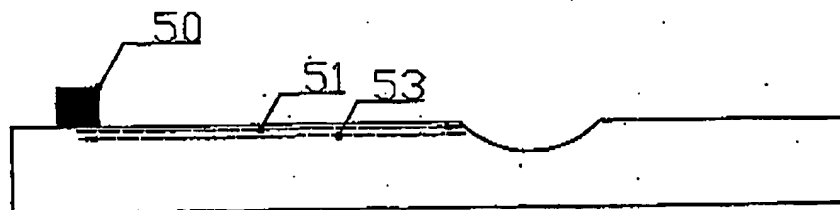
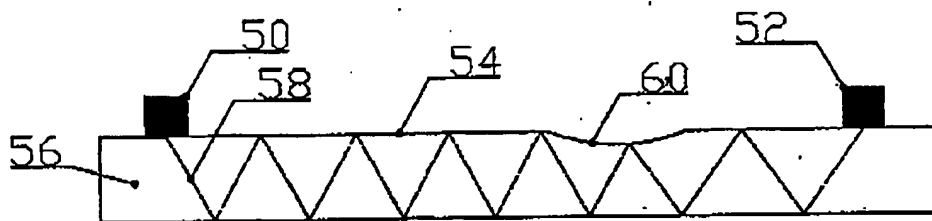
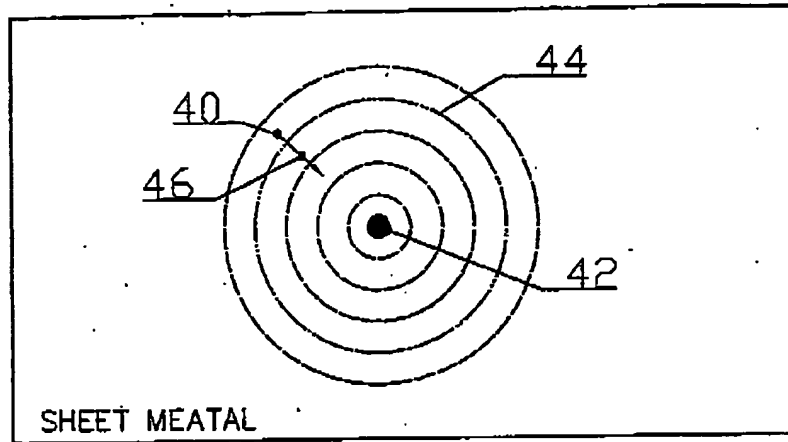
FIG. 3

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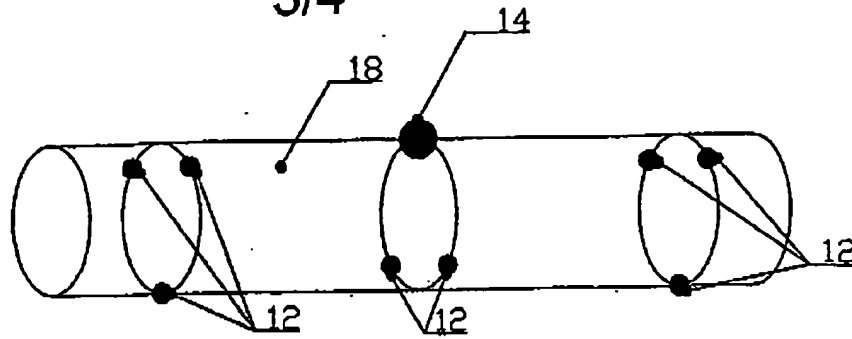


FIG 7

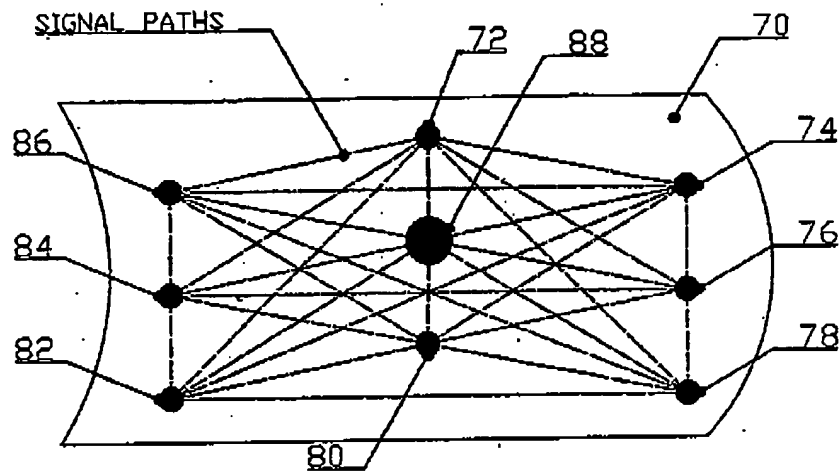


FIG 8

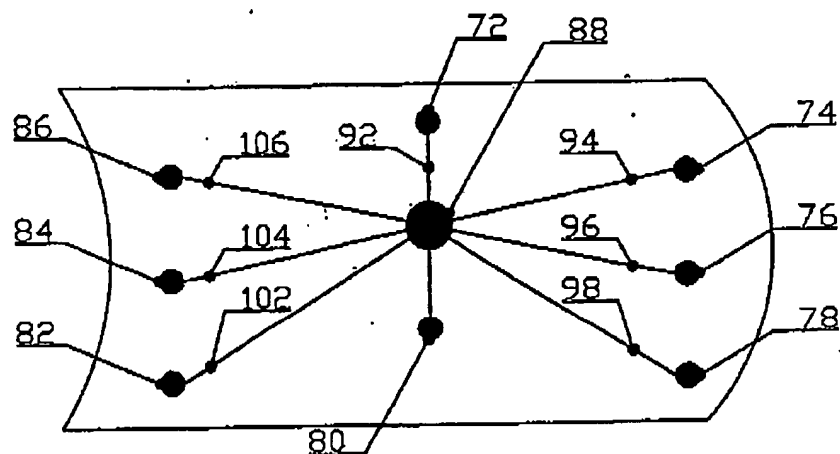


FIG 9

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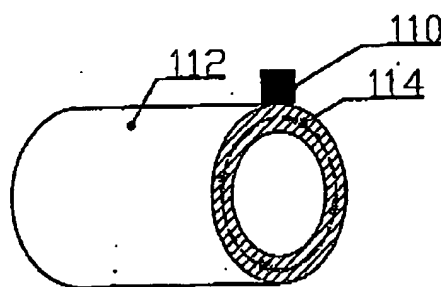


FIG 10

## MEASURING INSTRUMENT

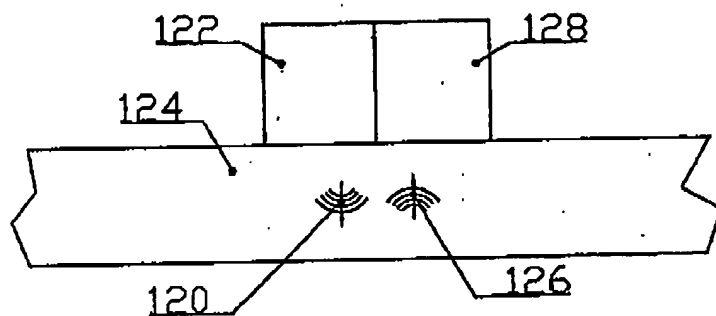


FIG 11